ABSTRACT

The MFIS transistors heretofore have a problem that after data writing, the data disappear in terms of memory transistor operation in about one day at most. This is mainly because the buffer layer and the ferroelectric have a high leakage current and, hence, charge is accumulated around the interface between the ferroelectric and the buffer layer so as to shield the electric polarization memorized by the ferroelectric, making it impossible for the electric polarization of the ferroelectric to control electrical conduction between the source and the drain in the transistor. In the present invention, by constituting an insulator buffer layer 2 of HfO_{2+u} or $Hf_{1-x}Al_{2x}O_{2+x+y}$, the leakage current flowing through each of the insulator buffer layer 2 and a ferroelectric 3 can be reduced and a memory transistor having a truly sufficient long data holding time is realized.

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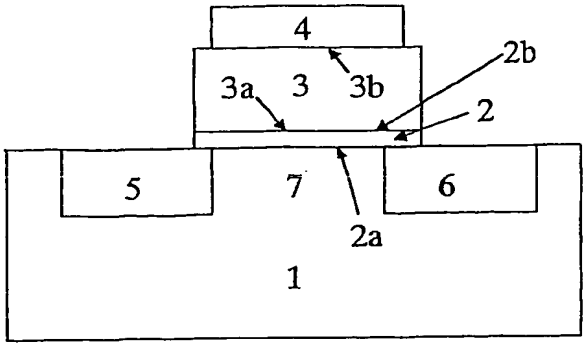

(57) Abstract: Conventionally MFIS transistors have involve a problem that data written in an MFIS transistor disappears in terms of memory transistor operation in at longest one day after the data is written. The reason is mainly because charge is accumulated near the interface between a ferroelectric body and a buffer layer and consequently the electric polarization that the ferroelectric body memorizes is shielded since the leakage currents of the buffer layer and the ferroelectric body are large, and as a result the electric polarization of the ferroelectric body cannot control the electric conduction between the source and drain of the transistor. According to the invention, an insulating buffer layer (2) is formed of HfO_{2+u} or $Hf_{1-x}Al_{2x}O_{2+x+y}$. Hence the leakage currents of the insulating buffer layer (2) and the ferroelectric body (3) can be reduced to low levels, and a memory transistor having a truly adequately long data holding time is realized.

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